DEMONSTRATION OF ANAPHYLACTIC RESPONSE IN HYPERSUSCEPTIBLE GUINEA PIGS SENSITIZED THROUGH TEETH[1]

DAVID WEISBERGER, B.S.

Member of the Class of 1930, Harvard University Dental School, Boston, Massachusetts

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I. INTRODUCTION

Some of the earliest observations relating to protein hypersusceptibility were made by Magendie, in 1839, according to a paper written by Morgenroth. Richet and Héricourt, in 1902, demonstrated the reaction by using sub-lethal doses of eel serum. Richet termed the reaction "anaphylaxis." Many other investigators have done work in this field. First Schultz and then Dale developed an isolated-tissue technique for the demonstration of this reaction. Dale's technique has been used in the present experiments.[2]

Hypersusceptibility is considered to be an antigen-antibody reaction, in that the postulates for this type of reaction are satisfied. In explaining the fundamental principles of the reaction, Zinsser[3] states that there are substances which, when introduced into the body, produce either an increased tolerance or an increased susceptibility. It is this latter possibility that tends to explain the hypersusceptibility

[1] Read at a session of the Seventh Annual Meeting of the International Association for Dental Research, Northwestern University Dental School, Chicago, Ill., March 23–24, 1929. See abstract: *Journal of Dental Research*, 1929, ix, p. 294. Also read at meetings of the Harriet Newell Lowell Society for Dental Research, Harvard Dental School, Boston, Mass., November 14, 1928, and the Boston Section of the International Association for Dental Research, University Club, Boston, March 11, 1929.

[2] Dale: *Journal of Pharmacology and Experimental Therapeutics*, 1913, iv, p. 167.

[3] Zinsser: Infection and resistance; Chapter XVI, p. 404.

produced by the introduction of a protein antigen into the body. The type of antibody involved is termed, at present, a "sessile receptor," because the site of the anaphylactic response is in the tissue cells. Some of the criteria governing the reaction, and which seem to be satisfied in the present experiments, are these:

(a) The antigen or sensitizing agent must be non-toxic.

(b) The antigen must be administered in sub-lethal doses.

(c) Substances must not produce anaphylaxis upon the first injection into non-sensitized animals (Wells).

(d) When guinea pigs are used, the typical uterine reaction should be demonstrable by the Dale method[2] (Wells).[4]

(e) Antigen coming into contact with the tissue cells of the body in any manner, without previous alteration by digestive ferments, may sensitize (Zinsser).

(f) Quantities of antigen as small as 0.000001 of a cc., have been effective. (In the present experiments, quantities varying from 0.001 to 0.01 of a cc. were used.)

(g) The incubation time varies. However, an optimum response can be elicited in a period of from eight to fourteen days.

(h) The duration of a hypersusceptible state has in one instance exceeded five hundred days. (Duration in the present experiments was not a factor. Reactions were produced as long as one month after the first injection.)

II. DETAILS OF THE PRESENT EXPERIMENTS

Animals: Female guinea pigs

Group A.—Guinea pigs sensitized through the pulp of each of the four anterior teeth (two maxillary, two mandibular).

Group B.—Guinea pigs sensitized through the dentine of the two maxillary and two mandibular anterior teeth.

Group C.—Animals from the same breed as *Groups A* and *B*; sensitized subcutaneously. (Sensitization *control.*)

Group D.—Animals from the same breed as *Groups A, B,* and *C*; untreated. (Normal *control.*)

[4] Wells: *Physiological Reviews,* 1921, 1, p. 44.

Antigen

Horse serum (normal) was used as the sensitizing agent, the same stock of serum having been used for *Groups A*, *B*, and *C*. The amount of horse serum used for *Groups A* and *B* was estimated to be from 0.001 to 0.01 of a cc. for each tooth. The amount of serum injected subcutaneously into sensitization control *Group C* was 0.001 cc. for each guinea pig.

Incubation period

A minimum of twelve days for incubation was allowed for each of *Groups A*, *B*, and *C*.

Preparation of teeth of animals in Groups A and B

Group A.—Guinea pigs were anesthetized with ether. A rubber dam was used to include the two maxillary and two mandibular anterior teeth. The cavities were made inciso-gingivally with a round bur No. ½, and were retained within the centre of the shaft of the tooth. In this group of animals the cavities were made in the teeth *deep enough to expose the pulp*. This was immediately evident by the perceptible difference in going from the relatively firm texture of the dentine into that of the soft pulp.

Group B.—(*Cavities limited to enamel and dentine.*) The cavity preparations were the same as for *Group A*, except for the difference in keeping the cavities within the enamel and dentine, *taking care not to include the pulp*.

Method of getting horse serum into the prepared cavities

Cotton points of the type used in root canals were cut slightly in excess of the depth of the cavities. The points were saturated with horse serum and then placed in the cavities. A slight force was used in packing the points into the cavities, which, in each tooth separately, with the cotton points in place, were sealed with a little gutta-percha and then covered with crown-and-bridge cement. During the time of cavity preparation, up to and including the sealing of the cavities, the animals were kept under ether anesthesia. This was done not only to prevent pain, but it was found necessary, in drilling into the centre

of these small-bore teeth, to have the animals under perfect control to prevent the bur from being pushed through the side of the tooth.

Preparation of uterus muscle for tests by the Dale technique

Group D.—(Untreated animals; normal control.) The animals in this group were tested before any of the animals in *Groups A*, *B*, and *C* were inoculated. This was done to ascertain whether there would be any interference by an acquired or passive hypersusceptibility for the protein in horse serum or by an abnormal reaction to foreign serum. An animal was anesthetized with ether; an abdominal incision made; and the two horns of the uterus, each ligated at their ends, were excised. One horn was immediately transferred to a reserve beaker containing Locke's solution. The other horn was placed into a beaker containing Locke's solution and used for recording the contractions. From experience with this method, it seems essential for good results to keep the animals alive until the horns of the uterus are completely excised. Also it seems necessary to excise the horns within about five minutes after the establishment of anesthesia.

Groups A, B and C.—The uterus preparations from animals in *Groups A*, *B*, and *C* were exactly the same as those for *Group D.*

Apparatus

The apparatus consisted of the typical set up for recording the rhythmic contractions of smooth muscle, with the addition of an arrangement to syphon off the solution containing the contracting muscle. The arrangement for retaining Locke's solution into which the contracting muscle was immersed, and keeping the temperature at 37.5°C., probably varied somewhat from that in the Dale technique. In this experiment two glass beakers were used. A large beaker of water held within it a supported smaller beaker containing the muscle and Locke's solution. The larger beaker was supported on a ring stand so that heat might be applied. The temperature of the Locke's solution was held within fairly constant limits of 37.5°C. For syphoning off the Locke's solution, a glass delivery tube was run to the bottom of the small beaker, which was slightly tipped, producing a lowest level, where the opening of the syphon was adjusted, thus assuring complete drainage.

Record of contractions on kymograph

After the muscle was set up, a record of normal contractions for the given muscle was obtained on a revolving kymograph. When this was established, the anaphylactic dose of horse serum was added to the Locke's solution. There were 250 cc. of Locke's solution in the beaker, to which 0.05 cc. of horse serum was added, giving a dilution of horse serum of 1–250,000 in Locke's solution.

III. RESULTS

Group A.—(Sensitized through *pulp.*) Following the addition of 0.05 cc. of horse serum, a period of about 30 seconds elapsed after which there was an abrupt rise of the muscle lever, higher than any previous contraction and showing a tetanic record. After a period of about 5 minutes, there was a gradual return from the tetanic state to a somewhat normal abscissa and rhythmic contractions. At this point the Locke's solution was syphoned off, the beaker was washed with Locke's solution, and the wash solution syphoned off. When this was completed, 250 cc. of fresh Locke's solution (kept at 37.5°C.) was run into the beaker and normal contractions again recorded. After several normal contractions, 0.05 cc. of horse serum was added. To this second dose there was no response—no tetanic-like contraction similar to that after the *first* dose of horse serum had been added. This demonstrates that the tetanic contraction of the muscle, after addition of the first 0.05 cc. of horse serum, was a true anaphylactic response, for the second addition of the same amount of horse serum did not produce a similar contraction. (*Fig. 1*)

Although not included in the accompanying graphs, additions of horse serum were made in increasing quantities. In some instances it required 2 or 3 cc. of horse serum to elicit a response, which however was not as great as the first. The latter response was a reaction to a foreign serum, which can be demonstrated only in instances of previous anaphylactic reaction and with an amount of horse serum many times greater than that necessary for a true anaphylactic effect in the uterus.

Group B.—(Sensitized through *dentine.*) The reaction for this group was of the same type as that for *Group A*, showing an anaphylactic response. (*Fig. 2*)

Group C.—(Sensitized *sub-cutaneously* with 0.001 cc. of serum; sensitization control.) The graph typical for this group shows a response similar to that for *Groups A* and *B*, proving that it was possi-

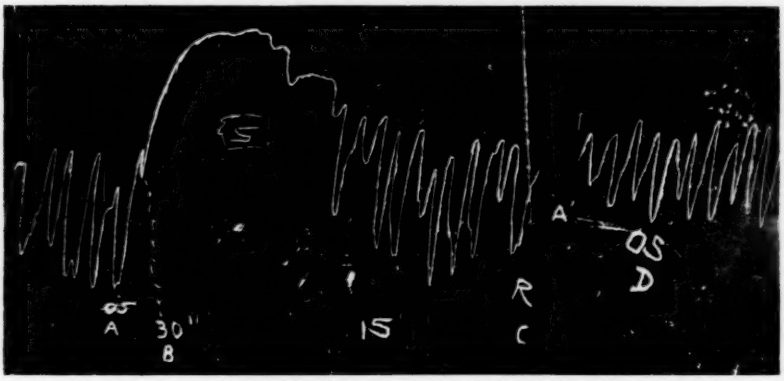

FIG. 1. GROUP A. ANIMALS SENSITIZED THROUGH PULP

A—Addition of 0.05 cc. of horse serum; reaction at *B*, thirty seconds later. *C*—Change of Locke's solution. *D*—Second addition of 0.05 cc. of horse serum; no response.

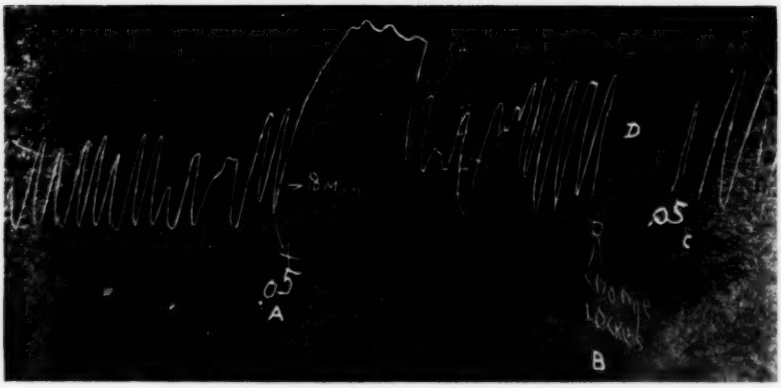

FIG. 2. GROUP B. ANIMALS SENSITIZED THROUGH DENTINE

A—Addition of 0.05 cc. of horse serum; immediate tetanic response. *B*—Change of Locke's solution. *C*—Second addition of 0.05 cc. of horse serum; no response.

ble to produce hypersusceptibility, in the stock of animals of *Groups A, B,* and *C,* with the same horse serum used in small quantities. (*Fig. 3*)

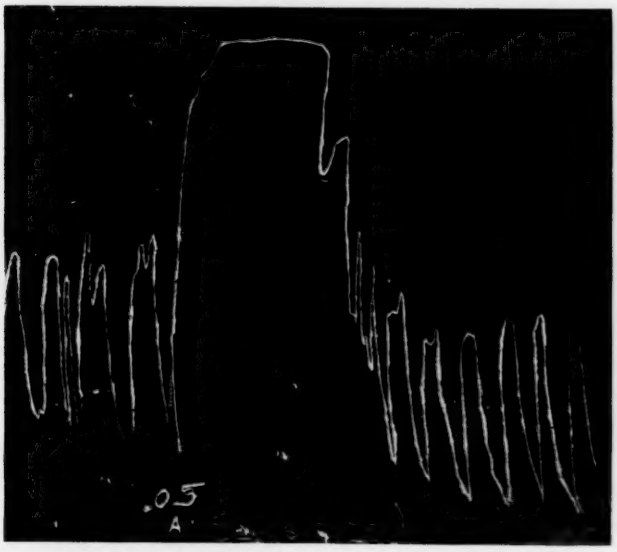

FIG. 3. GROUP C. ANIMALS SENSITIZED SUB-CUTANEOUSLY (SENSITIZATION CONTROL)

A—Addition of 0.05 cc. of horse serum; immediate tetanic response

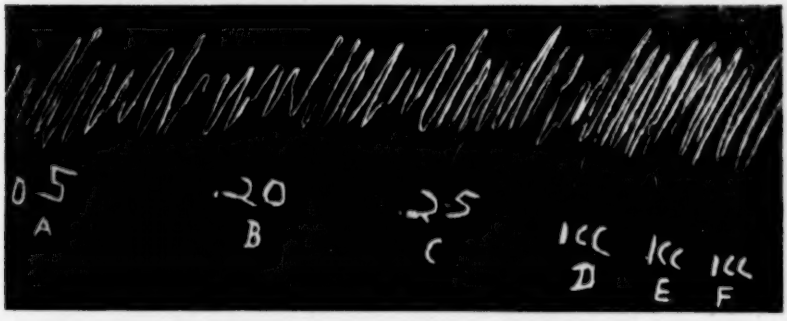

FIG. 4. GROUP D. ANIMALS UNTREATED (NORMAL CONTROL)

No anaphylactic response after successive additions of horse serum: 0.05 cc. at *A;* 0.2 cc. at *B;* 0.25 cc. at *C;* and 1 cc. at *D, E,* and *F,* respectively.

Group D.—(*Untreated* guinea pigs; normal control.) The graph shows no response to 0.05 cc. of horse serum; neither is there a response to 3.5 cc. of horse serum. Since this group of animals was tested for a response before members of the other groups had been inoculated, the result demonstrates that effects obtained for *Groups A*, *B*, and *C*, were true anaphylactic responses. (*Fig. 4*)

IV. CONCLUSIONS

A tooth of the guinea pig can act as a channel for the introduction of an antigen to the general circulation, resulting in antibody formation with consequent hypersusceptibility in remote tissues.

Where the reaction was accomplished by a mechanical exposure of the enamel and dentine to the protein antigen, it is reasonable to search for possible analogies in the human mouth. But more experimental work will be required before a relation can be said to exist between defective teeth and hypersensitivity.

It would be particularly interesting to study the possibilities pertaining to teeth that show no other pathology than superficial caries or developmental defects in the enamel.

The author acknowledges with thanks the assistance and suggestions of Dr. Fred W. Morse, Jr., of the Department of Bacteriology.

STERILIZATION[1]

An Improved Technique for Operations in Oral Surgery

STERLING V. MEAD, D.D.S.

Dental School, Georgetown University, Washington, D. C.

During the last few years sterilization has been given very careful study by the dentist. The requirements of a sterilization technique have become more exacting. The possibility of transmitting disease from one person to another, or that the operator may become infected from instruments used for dental operations, should not be minimized. The contention that, when operating in the mouth, the field is always contaminated, and that nature assists in protection, does not affect the possibility that bacteria foreign to the field may be imported. If there is need for aseptic technique in general surgery, there is need for it in oral surgery.

Errors in the surgical technique of some dentists are quite apparent. Even where there has been a desire to practise according to the principles of complete sterilization, it has not always been practical to have an aseptic technique in the dental operating room. Sterilization may be accomplished with chemical substances, or such physical agents as drying, light, electricity, and heat. Immersion of instruments for from ten to fifteen minutes in boiling water has been the accepted practice for many years. The literature contains much practical work along all of these lines.

The purpose of this paper is to outline a simple and practical aseptic technique for the sterilization of dental instruments and materials used in oral surgery, which has been adopted after careful study of all methods of sterilization. The dental schools, in training future dentists, must lead in the improvement of sterilization technique. This method has been adopted by Georgetown University for oral surgical procedures. There is every reason to believe that this method can be utilized also for other dental operations.

[1] Read at a session of the Seventh General Meeting of the International Association for Dental Research, at Northwestern University Dental School, Chicago, Illinois, March 23 and 24, 1929. *Journal of Dental Research*, 1929, ix, p. 298.

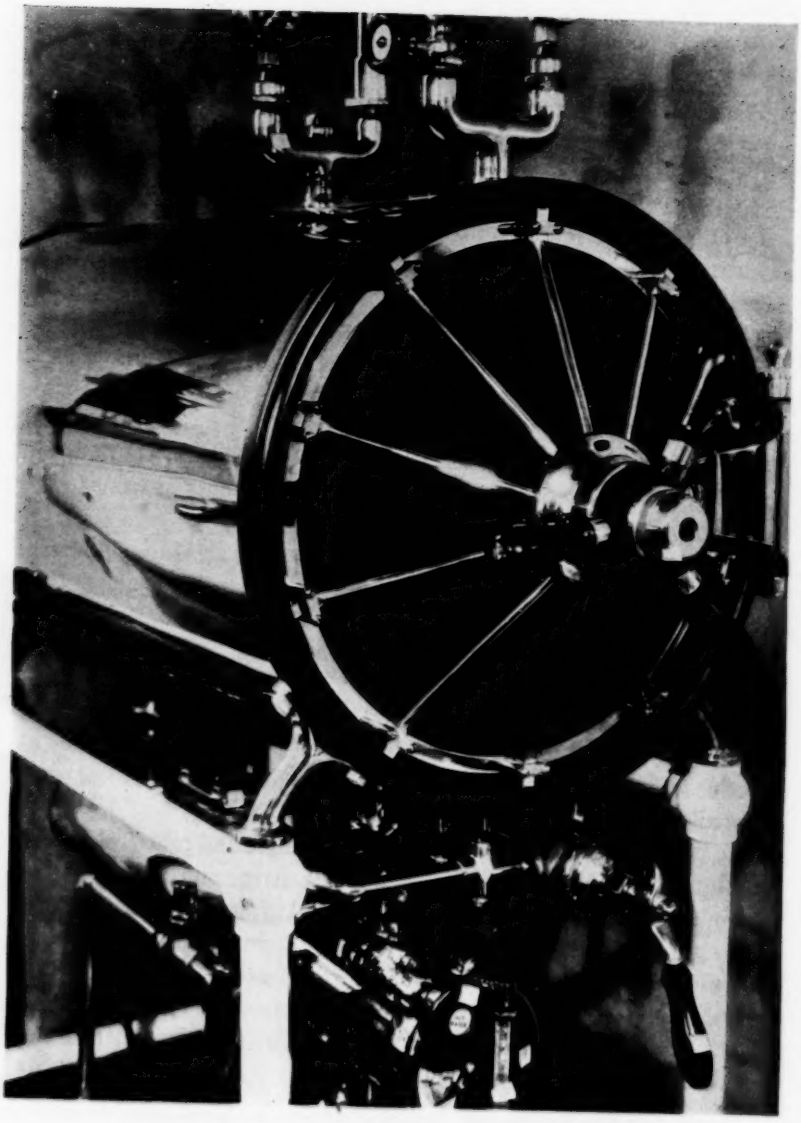

FIG. 1. AUTOCLAVE, CLOSED

The idea of autoclaving instruments is not new, but it is the method of application of this principle, through metal containers, that has solved our individual problem. The vegetative forms of bacteria are killed by contact for ten minutes with boiling water. A high degree of heat for a prolonged period is required to kill the spores of spore-bearing pathogenic organisms. Certain organisms in the resistant spore stage require higher temperatures or contact with boiling

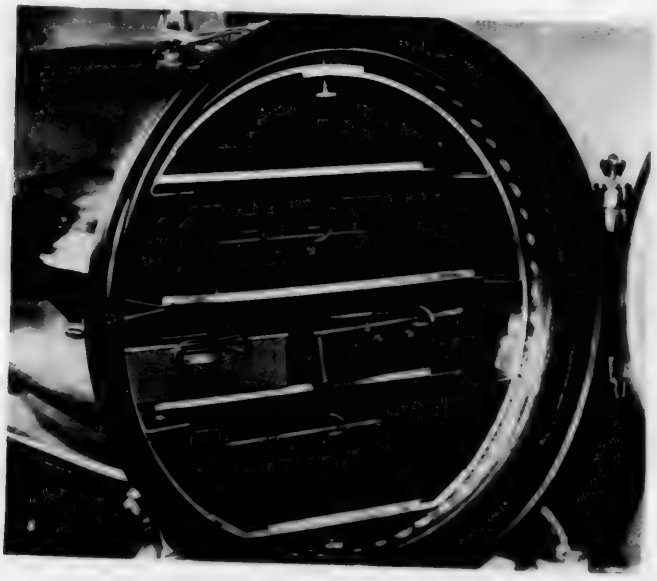

FIG. 2. AUTOCLAVE, INTERIOR VIEW, SHOWING FOUR METAL CONTAINERS READY FOR STERILIZATION

water for much longer periods than the usual sterilization time. Pressure steam-sterilization produces temperatures that are thoroughly destructive of bacteria, and meets more exacting requirements. Steam at 130°C. under pressure instantaneously destroys spores that would resist flowing steam at 100°C. for five or six hours. Mechanical cleansing of instruments with a brush or sponge, preferably in running water, is so effective that the number of spores remaining is too small to consider.

In our plan we have three different types of standard sets of instruments in daily use. A number of each of these sets, sterilized, are always on hand. Two different sets of special instruments are also used occasionally. The instruments, after being washed thoroughly, are dried, enclosed in one large towel with a towel for the patient, a towel for the operator, hypodermic syringe and anesthetic solution, gauze, cotton, and applicators, and the set put into a metal container.

FIG. 3. METAL CONTAINER, CLOSED

FIG. 4. METAL CONTAINER, OPEN, SHOWING CONTENTS

The lid is fastened down, and the contents kept for ten minutes under twenty pounds of pressure in the autoclave, where special racks hold twelve metal containers at one time. The entire time for the sterilization is thirty minutes; and the cost, about nine cents for electricity.

When needed, one of the metal containers is taken to the operating room by the nurse. The doctor "scrubs up" by washing his hands in green soap, and dipping them into 1–1000 solution bichloride of mer-

cury. Rubber gloves are worn for the operator's protection. The patient does not see the instruments until the operation starts. The nurse removes the lid from the container. The doctor lifts the towel containing everything needed, places them upon the table, and arranges everything to suit his convenience. Of course where practicable, a nurse, under all due precautions, can do this for him. These instruments are absolutely sterile, have not been exposed to the air, and

FIG. 5. METAL CONTAINER, OPEN, SHOWING CONTENTS

FIG. 6. STERILIZED INSTRUMENTS, ETC., ARRANGED FOR USE IN AN OPERATION

are handled only by the operator, who can take pains not to touch anything foreign to the operative field after "scrubbing up." It is recommended that syringes be sterilized individually, for each patient, with the instruments. Rubber gloves are best washed in lysol, then dried, "powdered," and autoclaved. They may be immersed in boiling water if desired.

Steel rusts when exposed to moist air, especially if the air is hot. Heavy instruments retain sufficient heat to vaporize moisture rapidly

after the steam escapes. It is only the light, delicate parts that need special protection. Because knives and scissors may be damaged by boiling water or autoclaving, 70 percent alcohol is used to sterilize them. Absorbent fabric, such as a towel, should be placed in the bottom of the instrument tray. The instruments, spread out upon this, may then be covered with another towel. The towels collect the condensation as fast as it occurs. This dissipates the free moisture and permits its rapid vaporization. Without absorbent covers, a considerable amount of water is condensed on the surfaces of the instruments. Where drops of water stand and later vaporize, spots or tarnish appear. The liberal use of oil in wiping instruments before they are put away prevents rusting sufficiently to warrant the trouble. This may be done by wiping with an oily cloth. Enough oil remains on the surfaces to protect them against rust in handling and in the pressure sterilizer.

When the chamber gauge reaches fifteen pounds, the time is noted as the beginning of the sterilization period. The pressure in the chamber is regulated in accordance with the following schedule:

Dressings (heavily loaded)	25–30 minutes at 15–22 pounds
Dressings (light load)	15–20 minutes at 15–22 pounds
Utensils	10–15 minutes at 15–22 pounds
Instruments	7–10 minutes at 15–22 pounds
Rubber gloves	15 minutes only at 14–16 pounds

As soon as the sterilization has been completed, the steam is exhausted from the chamber in the usual manner, and the final vacuum created as quickly as possible. Then the vacuum breaker is opened at once, and the door unlocked and loosened from the seat just enough to permit vapor to escape. The instruments are left in the sterilizer until vapor stops flowing from the top of the door and a minute or so longer if time permits. Any moisture on the instruments then vaporizes and quickly passes out.

The advantages of this method over the boiling techniques are these:

(1) More complete sterilization.

(2) Less difficulty in getting instruments from the sterilizer to the patient without contamination.

(3) Less damage to the instruments.

(4) No waste of cotton or gauze, as any unused portion may be resterilized.

BIOCHEMICAL STUDIES OF STREPTOCOCCI

VI. Relation of Osmotic Pressure to Availability of Synthetic Media[1]

FRANCES KRASNOW, Ph.D., and MIRIAM REINER, A.B.[2]

Laboratory of Biological Chemistry of Columbia University, at the College of Physicians and Surgeons, New York City

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I. INTRODUCTION

The osmotic pressure in the environment of an organism is believed to be an important influence on its metabolism. Dr. Frankel and her co-workers made the first attempt to apply this consideration to the investigation of synthetic media (2). The authors kept all their media isotonic with an M/6 NaCl solution. Falk, in his review of the rôle of certain ions in bacterial physiology, expressed the view that "an attempt to keep osmotic pressure constant is undoubtedly a step toward elucidation of the principles underlying the sound use of synthetic media" (1).

II. METHODS AND RESULTS

The preliminary work described in the present paper includes the determination of the osmotic pressures of four series of entirely different media, which were prepared and their availability for the strepto-

[1] The previous papers in this series were published in the *Journal of Dental Research*, 1919, ix: (1) Krasnow and Gies, p. 29; (2) Krasnow and Rosenberg, p. 123; (3) p. 321; (4) Krasnow, Harrow, and Reiner, p. 531; (5) Krasnow and Reiner, p. 653.

[2] A preliminary report was published in the *Proceedings of the Society for Experimental Biology and Medicine*, 1928, xxv, p. 483.

cocci tested by procedures already described.[1] Osmotic pressures were calculated from the freezing point depressions. The authors were aware at the outset of the inaccuracies in this method owing to the high molar concentration of several of the mixtures used. These errors do not invalidate the preliminary comparisons in this paper. The media studied are presented in Series 1, 2, 3, and 4.

Series 1

Medium 627 (3): $Fe_2(SO_4)_3 \cdot 9H_2O$, trace; $MgCO_3$, 0.02%; $MgNH\text{-}PO_4 \cdot 6H_2O$, 0.2%; $MgSO_4 \cdot 7H_2O$, 0.05%; K_2HPO_4, 0.1%; NaCl, 0.2%; 0.005 cc. NaOH(2.26M) per 5 cc. *Osmotic pressure:* 73 mm. Hg. *Growth:* 3+, 3+, +, +, +, in the first five subcultures of the first transplant; 2c, in the first subculture of the second transplant.

Medium 628 (3): $Fe_2(SO_4)_3 \cdot 9H_2O$, trace; $MgCO_3$, 0.02%; $MgSO_4 \cdot 7H_2O$, 0.05%; KCl, 0.2%; $NaNH_4HPO_4 \cdot 4H_2O$, 0.34%; 0.005 cc. NaOH (2.26M) per 5 cc. *Osmotic pressure:* 65 mm. Hg. *Growth:* 3+, 1c, in the first two subcultures of the first transplant.

Medium 629 (3): $Fe_2(SO_4)_3 \cdot 9H_2O$, trace; $MgSO_4 \cdot 7H_2O$, 0.03%; K_2HPO_4, 0.05%; Na_2CO_3, 0.1%; NaCl, 0.05%; $NaNO_3$, 0.1%. *Osmotic pressure:* 57 mm. Hg. *No growth.*

Series 2

Medium 27 (4): Aspartic acid, 0.2%; $MgSO_4 \cdot 7H_2O$, 0.1%; K_2HPO_4, 0.1%; 0.04 cc. NaOH (2.26M) per 5 cc. *Osmotic pressure:* 36 mm. Hg. *Growth:* 3+, 3+, 2+, in the first three subcultures of the first transplant; +, 2c, in the first two subcultures of the second transplant.

Medium 649 (4): Aspartic acid, 0.2%; NaCl, 0.1%; 0.05 cc. NaOH (2.26M) per 5 cc. *Osmotic pressure:* 57 mm. Hg. *No growth.*

Medium 650 (4): Aspartic acid, 0.2%; $CaCl_2$, 0.1%; 0.04 cc. NaOH (2.26M) per 5 cc. *Osmotic pressure:* 40 mm. Hg. *Growth:* 2+, in the first subculture of the first transplant.

Medium 651 (4): Aspartic acid, 0.2%; $MgCl_2$, 0.1%; 0.04 cc. NaOH (2.26M) per 5 cc. *Osmotic pressure:* 32 mm. Hg. *Growth:* +, in the first subculture of the first transplant.

Medium 652 (4): Aspartic acid, 0.2%; KCl, 0.1%; 0.04 cc. NaOH (2.26M) per 5 cc. *Osmotic pressure:* 44 mm. Hg. *Growth:* +, in the first subculture of the first transplant.

Medium 653 (4): Aspartic acid, 0.2%; $NaSO_4$, 0.1%; 0.04 cc. NaOH (2.26M) per 5 cc. *Osmotic pressure:* 49 mm. Hg. *Growth:* 2+, in the first subculture of the first transplant.

Medium 654 (4): Aspartic acid, 0.2%; $MgSO_4 \cdot 7H_2O$, 0.1%; 0.05 cc. NaOH (2.26M) per 5 cc. *Osmotic pressure:* 57 mm. Hg. *No growth.*

Medium 655 (4): Aspartic acid, 0.2%; K_2SO_4, 0.1%; 0.05 cc. NaOH (2.26M) per 5 cc. *Osmotic pressure:* 49 mm. Hg. *No growth.*

Medium 656 (4): Aspartic acid, 0.2%; NaCl, 0.1%; $Na_3PO_4 \cdot 12H_2O$, 0.1%; 0.04 cc. NaOH (2.26M) per 5 cc. *Osmotic pressure:* 69 mm. Hg. *No growth.*

Medium 657 (4): Aspartic acid, 0.2%; $MgCl_2$, 0.1%; $Na_3PO_4 \cdot 12H_2O$, 0.1%; 0.03 cc. NaOH (2.26M) per 5 cc. *Osmotic pressure:* 36 mm. Hg. *No growth.*

Medium 658 (4): Aspartic acid, 0.2%; $CaSO_4$, 0.1%; 0.045 cc. NaOH (2.26M) per 5 cc. *Osmotic pressure:* 40 mm. Hg. *Growth:* +, in the first subculture of the first transplant.

Medium 659 (4): Aspartic acid, 0.2%; $Na_3PO_4 \cdot 12H_2O$, 0.1%; Na_2SO_4, 0.1%; 0.04 cc. NaOH (2.26M) per 5 cc. *Osmotic pressure:* 53 mm. Hg. *Growth:* 2+, in the first subculture of the first transplant.

Medium 660 (4): Aspartic acid, 0.2%; $MgSO_4 \cdot 7H_2O$, 0.1%; $Na_3PO_4 \cdot 12H_2O$, 0.1%; 0.04 cc. NaOH (2.26M) per 5 cc. *Osmotic pressure:* 36 mm. Hg. *Growth:* 3+, in the first subculture of the first transplant.

Medium 661 (4): Aspartic acid, 0.2%; K_2SO_4, 0.1%; $Na_3PO_4 \cdot 12H_2O$, 0.1%; 0.35 cc. NaOH (2.26M) per 5 cc. *Osmotic pressure:* 49 mm. Hg. *Growth:* 3+, in the first subculture of the first transplant.

Medium 662 (4): Aspartic acid, 0.2%; $Na_3PO_4 \cdot 12H_2O$, 0.1%; 0.03 cc. NaOH (2.26M) per 5 cc. *Osmotic pressure:* 49 mm. Hg. *Growth:* 3+, 2c, in the first and third subcultures of the first transplant.

Medium 663 (4): Aspartic acid, 0.2%; $Mg_3(PO_4)_2 \cdot 4H_2O$, 0.1%; 0.04 cc. NaOH (2.26M) per 5 cc. *Osmotic pressure:* 24 mm. Hg. *Growth:* 3+, 2c, in the first and third subculture of the first transplant.

Medium 664 (4): Aspartic acid, 0.2%; K_3PO_4, 0.1%; 0.04 cc. NaOH (2.26M) per 5 cc. *Osmotic pressure:* 49 mm. Hg. *Growth:* +, in the first subculture of the first transplant.

Medium 665 (4): Aspartic acid, 0.2%; $Ca_3(PO_4)_2$, 0.1%; 0.04 cc. NaOH (2.26M) per 5 cc. *Osmotic pressure:* 16 mm. Hg. *Growth:* 4+, 3+, in the first two subcultures of the first transplant.

Medium 666 (4): Aspartic acid, 0.2%; $MgSO_4 \cdot 7H_2O$, 0.1%; $Na_3PO_4 \cdot 12H_2O$, 0.001%; 0.05 cc. NaOH (2.26M) per 5 cc. *Osmotic pressure:* 45 mm. Hg. *Growth:* 2+, 1c, in the first two subcultures of the first transplant.

Medium 667 (4): NH_4 lactate, 0.05%, $MgSO_4 \cdot 7H_2O$, 0.1%; $Na_3PO_4 \cdot 12H_2O$, 0.1%; 0.03 cc. NaOH (2.26M) per 5 cc. *Osmotic pressure:* 69 mm. Hg. *No growth.*

Medium 668 (4): $(NH_4)_3$ citrate, 0.5%; $MgSO_4 \cdot 7H_2O$, 0.1%; $Na_2PO_4 \cdot 12H_2O$, 0.1%; 0.05 cc. NaOH (2.26M) per 5 cc. *Osmotic pressure:* 89 mm. Hg. *Growth:* 3+, in the first subculture of the first transplant.

Medium 669 (4): $(NH_4)_2$ tartrate, 0.5%; $MgSO_4 \cdot 7H_2O$, 0.1%; $Na_2PO_4 \cdot 12H_2O$, 0.1%; 0.13 cc. NaOH (2.26M) per 5 cc. *Osmotic pressure:* 151 mm. Hg. *Growth:* 3+, in the first subculture of the first transplant.

Medium 670 (4): $MgSO_4 \cdot 7H_2O$, 0.1%; K_2PO_4, 0.05%; $Na_2PO_4 \cdot 12H_2O$, 0.1%. *Osmotic pressure:* 12 mm. Hg. *No growth.*

Medium 671 (4): Aspartic acid, 0.2%; $Na_2PO_4 \cdot 12H_2O$, 1.0%; Na_2SO_4, 0.0001%. *Osmotic pressure:* 122 mm. Hg. *No growth.*

Medium 672 (4): Aspartic acid, 0.1%; $Na_2PO_4 \cdot 12H_2O$, 0.5%; Na_2SO_4, 0.0001%. *Osmotic pressure:* 69 mm. Hg. *Growth:* 3+, in the first subculture of the first transplant.

Medium 673 (4): Aspartic acid, 0.2%; $Na_2PO_4 \cdot 12H_2O$, 0.2%; Na_2SO_4, 0.0001%; 0.03 cc. NaOH (2.26M) per 5 cc. *Osmotic pressure:* 49 mm. Hg. *Growth:* 3+, in the first subculture of the first transplant.

Medium 685 (4): Aspartic acid, 0.2%; $Na_2PO_4 \cdot 12H_2O$, 0.1%; Na_2SO_4, 0.0001%; 0.03 cc. NaOH (2.26M) per 5 cc. *Osmotic pressure:* 32 mm. Hg. *Growth:* 3+, in the first subculture of the first transplant.

Series 3

Basic mixture: $CaCl_2$, trace; glycerol, 5.0%; $MgSO_4 \cdot 7H_2O$, trace; KH_2PO_4, 0.2724%; NaCl, 0.5%.

Medium 674 (5): Basic mixture plus $(NH_4)_2$ oxalate$\cdot H_2O$, 1.4208%; 0.07 cc. NaOH (2.26M) per 5 cc. *Osmotic pressure:* 850 mm. Hg. *Growth:* 2c, in the first subculture of the first transplant.

Medium 675 (0.12): Basic mixture plus NH_4 lactate, 1.21%;[3] 0.12 cc. NaOH (2.26M) per 5 cc. *Osmotic pressure:* 788 mm. Hg. *No growth.*

Medium 676 (5): Basic mixture plus NH_4 lactate, 0.7708%; 0.12 cc. NaOH (2.26M) per 5 cc. *Osmotic pressure:* 792 mm. Hg. *No growth.*

Medium 677 (5): Basic mixture plus urea, 0.6004%; 0.1 cc. NaOH (2.26M) per 5 cc. *Osmotic pressure:* 780 mm. Hg. *No growth.*

Medium 688 (5): Basic mixture plus creatinine, 1.132%; 0.05 cc. NaOH (2.26M) per 5 cc. *Osmotic pressure:* 730 mm. Hg. *No growth.*

Medium 679 (5): Basic mixture plus NH_4Cl, 0.5348%; 0.1 cc. NaOH (2.26M) per 5 cc. *Osmotic pressure:* 817 mm. Hg. *No growth.*

Medium 680 (5): Basic mixture plus tyrosine, 1.8112%; 0.07 cc. NaOH (2.26M) per 5 cc. *Osmotic pressure:* 666 mm. Hg. *Growth:* 3+, 2+, 2+,

[3] Long (5) used 1.07 per cent NH_4 lactate.

in the first three subcultures of the first transplant; 6c, 3c, in the first two subcultures of the second transplant.

Medium 682 (5): Basic mixture plus histidine-HCl, 1.55%; 0.2 cc. NaOH (2.26M) per 5 cc. *Osmotic pressure:* 813 mm. Hg. *Growth:* 2+, 2+, 3+, 2+, 2+, 2+, in the six subcultures of the first transplant; 1c, in the first subculture of the second transplant.

Medium 683 (5): Basic mixture plus leucine, 1.3116%; 0.1 cc. NaOH (2.26M) per 5 cc. *Osmotic pressure:* 727 mm. Hg. *Growth:* 3+, 2+, +, +, +, +, in the six subcultures of the first transplant.

Medium 684 (5): Basic mixture plus alanine, 0.8908%; 0.07 cc. NaOH (2.26M) per 5 cc. *Osmotic pressure:* 710 mm. Hg. *Growth:* 2+, 3+, 2+, in the first three subcultures of the first transplant; 1c, in the first subculture of the second transplant.

Series 4

Medium 686 (6): $MgCl_2$, 0.25%; KNO_3, 0.1%; NaCl, 3.0%; $Na_2HPO_4 \cdot 12H_2O$, 0.05%; $Na_2S_2O_3 \cdot 5H_2O$, 0.2%; 0.03 cc. NaOH (2.26M) per 5 cc. *Osmotic pressure:* 858 mm. Hg. *No growth.*

Medium 687 (6): Medium 686 plus sucrose, 0.5%; 0.03 cc. NaOH (2.26M) per 5 cc. *Osmotic pressure:* 858 mm. Hg. *Growth:* 3+, 3+, 2+, in the first three subcultures of the first transplant.

Medium 688 (6): Medium 686 plus glycerol, 0.5%; 0.03 cc. NaOH (2.26M) per 5 cc. *Osmotic pressure:* 915 mm. Hg. *No growth.*

Medium 689 (6): Medium 686 plus K Na tartrate $\cdot 4H_2O$, 0.2%. *Osmotic pressure:* 911 mm. Hg. *Growth:* 4+, 3+, 2+, in the first three subcultures of the first transplant.

Medium 690 (6): Medium 686 plus K_2 oxalate $\cdot H_2O$, 0.1%; 0.03 cc. NaOH (2.26M) per 5 cc. *Osmotic pressure:* 850 mm. Hg. *No growth.*

Medium 691 (6): Medium 686 plus urea, 0.2%; 0.025 cc. NaOH (2.26M) per 5 cc. *Osmotic pressure:* 874 mm. Hg. *No growth.*

The significance of these details is shown at a glance in the accompanying tabulations.

I

	OSMOTIC PRESSURES IN MILLIMETERS OF HG		
	12 to 49	53 to 151	666 to 915
Total number of media	18	12	16
Number showing growth	16	6	7
Percentage showing growth	89	50	44

II

	OSMOTIC PRESSURES IN MILLIMETERS OF HG				
	12 to 40	40 to 49	53 to 151	666 to 813	817 to 915
Total number of media	10	8	12	8	8
Number showing growth	9	7	6	4	3
Percentage showing growth	90	87.5	50	50	37.5

III. CONCLUSIONS

1. When the forty-six media used in this study are divided arbitrarily into three groups on the basis of differences in osmotic pressure, it is found that growth for shorter or longer periods occurred in 89 per cent of those with osmotic pressures below 50 mm. Hg.; in 50 percent of the media with pressures below 151 and above 53 mm. Hg.; and in 44 percent of those having osmotic pressures between 666 and 915 mm. Hg.

2. Similar gradations appear when the media are divided into five groups. Growth occurred in 90 percent of the media having pressures below 40 mm. Hg.; in 87.5 percent having osmotic pressures between 40 and 49 mm. Hg.; in 50 percent having osmotic pressures above 49 and below 813 mm. Hg.; and in 37.5 percent having osmotic pressures between 817 and 915 mm. Hg.

3. The number of media showing growth increased as the osmotic pressures decreased.

Additional research will be necessary to determine the optimum osmotic pressure for streptococci.

IV. GENERAL SUMMARY RELATING TO THE SERIES OF PAPERS IN THIS VOLUME

Of the common media that were studied, the most useful was the Jablons medium, which supported life in the greatest number of organisms for the longest periods.

In our study of 671 different combinations of ingredients, in synthetic culture media for streptococci, 441 permitted the organisms to remain viable. But none of the media showed growth in the fourth, fifth, or sixth transplant. However, although there were no synthetic media that supported the continued growth of streptococci, many of

them were used to test the value of various substances as nutrients. The effect of any substance, whether beneficial or detrimental, may be most easily observed by adding it to a medium that just barely supports life in the organism. This is equally true for beneficial substances in media that just fail to permit growth. In this manner we have shown, for example, that glycerol and organic acids (citric, lactic, malic, tartaric) were more often beneficial than carbohydrates (dextrose, galactose, lactose, maltose, raffinose, sucrose, mannite). Of the carbohydrates, sucrose was usually the most beneficial, but was also sometimes detrimental, while dextrose was usually detrimental and seldom beneficial.

An interesting question arises in this connection. Is it possible to ascertain whether an added substance produces the effects observed or whether these effects are due to the absence of some material? Because of the doubt in this relation, many different series of media were examined. In our paper on the carbon compounds[4] Table 6 shows that dextrose, lactose, and maltose were equal in their effects on the growth of streptococci, while Table 7 shows that lactose and maltose were more beneficial than dextrose. The data in Tables 12–17, indicated that glycerol was often beneficial; in Tables 18, 19, and 20 that it was often without effect. Similar variations were noted in the work on the nitrogen and inorganic compounds. The complete explanation for such inconstant behavior is not apparent. But it is evident that no definite conclusion can be drawn regarding the comparative utilization of one or more substances when only one basal mixture is considered. As has been indicated, the effect of adding such compounds to a medium, on its availability for the organism, may be very different from that of adding the same compound to another medium. All of our recorded results must be interpreted from this point of view.

Very often an organism, accustomed to a certain medium, will not grow immediately and normally on an entirely different one. This is especially true of fastidious bacteria. Every organism must be given an opportunity to become acclimated before final conclusions can be drawn regarding its metabolic processes.

[4] Krasnow and Rosenberg: *Journal of Dental Research*, 1929, ix, p. 321.

One of the chief aims in this series of studies was to devise a technique for determining the availability of synthetic media for streptococci. In doing so, we have pointed out principles, developed procedure, and presented details, which with the reservations indicated above, may be applied to the study of media generally and to synthetic media in particular.

V. BIBLIOGRAPHY

(1) FALK 1923 *Bacteriological Abstracts*, vii, p. 49.
(2) FRANKEL, BARBER, AND PYLE 1919 *Journal of Infectious Diseases*, xxiv, p. 9.
(3) GIBBS 1919 Soil Science, viii, p. 427.
(4) JORDAN 1899 *Botanical Gazette*, xxvii, p. 19.
(5) LONG 1922 *American Review for Tuberculosis*, v, p. 857.
(6) NATHANSOHN 1901–1902 *Mitteilungen aus der zoologischen Station zur Neapel*, xv, p. 655.

WILLIAM J. GIES FELLOWSHIP IN BIOLOGICAL CHEMISTRY AT COLUMBIA UNIVERSITY[1]

EDGAR G. MILLER, JR., PH.D., *Chairman of the Fellowship Committee*

Department of Biological Chemistry, College of Physicians and Surgeons, Columbia University, New York City

A large proportion of the Gies Fellowship Fund has been contributed by dentists and dental organizations. It is appropriate, therefore, to publish in this *Journal* an annual statement of the status and use of the Fund. Dr. Gies, during the remainder of his active career, will select the Fellows. He has indicated his intention to accept this privilege as an opportunity annually to contribute to the promotion of teaching and research in dental schools.

Researches and publications

Theodor Rosebury, D.D.S. (Pennsylvania, 1928) served as the Fellow in 1928–29. He conducted advanced work in preparation for a career of teaching and research in dentistry, and successfully completed two important investigations, one of which, in the Biochemical Department, resulted in showing that enamel contains keratin but no soluble protein;[2] the other, in the Bacteriological Department, indicates that there is no reason at present for differentiating between the aciduric organisms of dental caries and L. acidophilus of the intestine.[3] The completed papers descriptive of these two researches are about to be published in the *Journal of Dental Research* and the *Journal of Bacteriology*, respectively.

Dr. Rosebury has been reappointed Fellow for the year 1929–30, and is now engaged in further studies of enamel and in an inquiry into possible salivary factors in resistance to dental decay.

[1] Previous annual statements were published in the *Journal of Dental Research*: (1) 1927, vii, p. 530; (2) 1928, viii, p. 679.

[2] Rosebury and Gies: Preliminary report; *Journal of Dental Research*, 1929, ix, p. 299.

[3] Rosebury, Linton, and Buchbinder: Preliminary report; *Ibid.*, p. 529.

The research on salivary mucin by Dr. J. M. Inouye, Fellow in 1928, will be published in an early issue of the *Journal of Dental Research.*

Personnel

The register of Fellows is appended:

I. 1928 (second semester). James M. Inouye, M.A., Ph.D.
II. 1928–29. Theodor Rosebury, D.D.S.
III. 1929–30. Theodor Rosebury, D.D.S.

Library facilities

In 1928, Dr. Gies presented to Columbia University, for the use of the Medical and Dental Schools, his personal library consisting of about 5000 books and volumes of journals, approximately half the number consisting of dental publications. Occasionally he makes additions to the group. These volumes are now in the general library at the Columbia-Presbyterian Medical Center. At the suggestion of the Librarian of the University, the book label in each of the volumes comprising this gift bears the legend: "Presented by Dr. William J. Gies to enrich the library resources available to holders of the Gies Fellowship in Biological Chemistry."

Financial statement

By the terms of the gift establishing the Fellowship, as stated by the joint committees originally in charge, 50 per cent of the net income per year may be paid to the Fellows during the first ten years after the establishment of the Fellowship (1928–1937), and "all unexpended income shall be added to the principal." The capital sum was in-increased $3,000 during the year 1928–29 by $2,300 in gifts, plus the unexpended income (50 percent) amounting to $700. The stipend for the Fellow was increased from $700—one half the income from the principal of the Fund—to $1200, by payments of $300 from the Louise C. Ball Trust Fund and of $200 by anonymous donors.

Financial summary

Principal of the Gies (William J.) Fellowship Fund, as recorded in the last annual statement[4]	$27,387.06
Additions obtained in 1928–29, by Dr. Hattie L. Heft, from contributors named in the last annual statement	2,300.00
Unexpended portion of the income (50 percent) in 1928–29[5]	700.00
Total amount of the principal of the Fund held by Columbia University on June 30, 1929	$30,387.06
Amount of the Trust Fund established by Dr. Louise C. Ball in behalf of the Fellowship	10,000.00
Total amount of the Funds established for the support of the Fellowship	$40,387.06

Stipend for the Fellow in 1929–30

Interest on the Fund held by Columbia University: $1,519.35. Of this amount, one-half will be added to the principal sum, the other half paid to the Fellow	$759.67
Interest on the Trust Fund established by Dr. Louise C. Ball	500.00
Interest on contributions that may be received during 1929–30 and assured gifts by anonymous donors	240.33
Total amount payable to the Fellow	$1,500.00

Additions to the Fund should be made payable to the Treasurer of Columbia University, but may be sent to the Fellowship Committee of the Biochemical Department of Columbia University.

October 31, 1929.

[4] *Journal of Dental Research*, 1928, viii, p. 685.

[5] The earned income for 1928–29 was $1,395.52. An anonymous donor contributed $4.48 to carry the total to $1400.

FURTHER COMMENT ON A REFERENCE TO THE CARNEGIE FOUNDATION'S STUDY OF DENTAL EDUCATION

WILLIAM J. GIES, PH.D.

School of Medicine, Columbia University, New York City

On page 586 of this volume, Dr. Alfred J. Asgis,[1] referring to the validity of the data and conclusions in the Carnegie Foundation's *Bulletin on Dental Education*, made this statement:

"Psychological (social) and cultural (economic) forces of dental-autonomy are so subtly at work in the dental profession that even an astute mind like that of Prof. Gies was unable to detect and to resist their influence, *which colored the data and logically the 'conclusions' of his study*." (Italic not in the original.)

On page 608 of the same issue, the present writer,[2] alluding to this personal assertion by Dr. Asgis, responded as follows:

"If the comment I have italicized [same as above] is warranted, it is also important, and the whole truth on which it rests should be stated to the Carnegie Foundation and also published. Dr. Asgis is hereby invited to publish, in this *Journal*, either a revelation of the facts that justify his assertion, or a suitable statement that such facts are not known to him."

It seems to be obvious that establishment of the validity of Dr. Asgis' personal assertion, or public withdrawal of the statement, is a crucial matter in any serious further discussion by him, in this *Journal*, of the Carnegie Foundation's study of dental education.

I had hoped to prepare carefully, for the October or December number of this volume, the prospective discussion of certain general portions of Dr. Asgis' report that were "reserved for a future issue" (p. 595), especially "the proposed substitution of the term 'stoma-

[1] Asgis: *Journal of Dental Research*, 1929, ix, p. 555.
[2] Gies: *Ibid.*, p. 595.

tology' for 'dentistry' and also the two-three-graduate plan" (p. 608). I expected, in each case, to complete the manuscript and submit a copy to Dr. Asgis well in advance of the printing of the number to contain my discussion, so that he would have an opportunity to publish, in the same issue, the response he might wish to make. But urgent duties in public service prevented execution of this program, and it has been necessary to postpone the discussion to the first number in the next volume. Meanwhile, my intention to give Dr. Asgis an opportunity to reply simultaneously to the discussion "reserved for a future issue" was stated to him on several occasions, and the conditions that enforced delay were indicated. His attention was also drawn to the invitation extended to him on page 608, and to the desirability of publishing, in the volume containing the personal allusion quoted on page 745, a response by him that would be "either a revelation of the facts that justify his assertion, or a suitable statement that such facts are not known to him."

Instead of accepting that invitation, however, Dr. Asgis, on October 21 and 22, 1929, presented for publication in this issue five sections of a lengthy manuscript in which his only allusion to the two quotations on page 745 was the remark that his personal assertion and my response were among comments that "deal with subject matter that need not be considered at this time since they all deal with topics relevant to my [Asgis'] report proper." Discussion with Dr. Asgis of this indirect way of declining the invitation to publish in this volume either a revelation of the facts that justify the quoted personal comment, or a suitable statement that such facts are not known to him, developed further evasion but no evidence. Dr. Asgis has repeatedly alleged that editors of dental journals, in order to prevent his views from receiving attention, have conspired to keep his communications out of the dental press. Yet here is an instance where he declined to accept public and private invitations to discuss fully and responsibly, in a dental journal, a particular subject there predicated by himself.

The manuscript recently submitted by Dr. Asgis not only evades the issue directly presented to him but also abounds in misrepresentations. Thus at one place he states that four changes in his report, as printed in our August issue (page 555), were made without his knowledge or approval. Yet these four substitutes—merely routine altera-

tions in form, or in the phraseology of well known facts—were in every detail abandoned by the editor, and *the original words and phrases restored, when and because Dr. Asgis expressed his wish to that effect on the galley proof.* On his copy of the final page proof, he himself confirmed the accuracy of the restorations to the original forms, and by letter indicated his approval.

At another place in the manuscript Dr. Asgis would create the erroneous impression that he did not approve the editorial footnote ("*Ed.*") on the first page of his report (page 555), in which he is termed "the leader of the 'stomatologic movement' in North America." Yet he returned both a galley proof and a page proof containing the footnote without suggesting any change in the footnote; and, in associated correspondence, *indicated accord with it.* The proof of Dr. Asgis' paper in the August issue was passed by him in its final paged form, with several additional typographical corrections, as perfectly satisfactory, the available records amply testifying to this fact. The proofs returned by Dr. Asgis have been preserved with the letters relating to them. This procedure was unusual, but in this instance fortunate.

Illustrations of misrepresentation in Dr. Asgis' manuscript might be multiplied, but the foregoing suffice to indicate briefly its lack of reliability. When Dr. Asgis' attention was called to some of its gross untruths, he was satisfied to suggest that I might make "notations" if "necessary," the net result of which would be a willful waste of the *Journal's* resources. Last May, in the desire to meet Dr. Asgis' criticism that dental journals have been closed against him, his report on the Carnegie Foundation's study of dental education, assumed to be truthful and fair, was unwisely accepted for publication in our August issue before the manuscript had been received or the nature of its contents was understood. After the manuscript had been examined, and its irresponsibility noted, it was regretfully published under the conditions stated on page 607. But this experience, which other editors have foreseen and escaped, was profitable in what it has taught. The manuscript recently received from Dr. Asgis, being untruthful, will not appear in this *Journal*, despite his threat to publish it elsewhere as an alternative. Future communications from Dr.

Alfred J. Asgis would not be accepted for publication unless their complete reliability in all instances were assured by responsible referees.

This *Journal* carries the standing assurance that it "represents an unwavering purpose to keep widely open the channel to freedom of *responsible* and *respectable* expression of truth and opinion, by individuals or organizations, without qualification by or for any views its editors individually may entertain." The career of the *Journal* has been a continual exemplification of this purpose. We welcome worthy papers on any aspect of oral hygiene and oral health-service, whether termed dentistry, stomatology, or medicine, or designated by any other name. Papers descriptive of research will continue to receive precedence in accordance with the *Journal's* primary function.

SUPPLEMENT

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I. First District Dental Society of the State of New York

SUMMARY OF ACTIVITIES

John Oppie McCall, A.B., D.D.S., F.A.A.P., F.A.C.D., Editor

The following is a summary of the activities of the First District Dental Society for the season of 1928–29. Routine activities have included the usual monthly scientific meetings of the Society and its various sections. The December meeting, which for several years has been expanded to a four-day meeting under the title of the "Better Dentistry Meeting," again attracted a record attendance. The proceedings of the Board of Directors, and the reports of various standing and special committees, have been published in the monthly *Bulletin* of the Society.

Outstanding events have been the presentation of the Librarian's report by Dr. B. W. Weinberger, summarizing his fifteen years of continuous service as Librarian. This constitutes a record of the

growth, wisely fostered, of what is recognized as one of the best, if not the best, dental libraries in existence. Dr. Weinberger was also responsible for the adoption of a new seal for the Society, designed under his advisement. This year has also seen the completion by Dr. Weinberger, and the publication under the auspices of the Society, of a bibliography of the books, periodicals, and other dental publications in the library of the New York Academy of Medicine. This bibliography also contains the titles of dental publications in Dr. Weinberger's private library, which will eventually become a part of the Academy collection.

The past season has also seen the final consummation of plans for the enlargement of the *Bulletin* of the Society into a journal in which will be published certain of the papers read before the Society and its sections.

The following plan for the enlarged *Bulletin*, submitted to the Board of Directors for the publication of the papers read before the First District Dental Society and the Sections thereof, was recommended at their meeting on January 21, 1929 and adopted at the meeting of the Society on February 4, 1929.

NEW PLAN FOR THE PUBLICATION OF THE PROCEEDINGS

"1. The *Journal of Dental Research* shall have the privilege of publishing all research papers read before the First District Dental Society or the Sections, if the *Journal* so desires. Papers not to be so published shall be returned to the Editor within two months' time to be published as hereinafter provided.

"2. The First District *Bulletin* shall eventually be enlarged and modified with the view of publishing all papers read before the sections and the First District Dental Society that are not published in the *Journal of Dental Research*.

"3. The size of the *Bulletin* shall be increased gradually, and properly censored advertising shall be secured to pay expenses incurred in increasing the size of the *Bulletin*.

"4. The change in the *Bulletin* shall be gradual so as to avoid throwing a large amount of extra expense upon the Society.

"5. The Publication Committee shall be increased to six men including the Editor. The five men exclusive of the Editor shall serve for a period of

five years, one to be elected each year by the Board of Directors. The first Publication Committee shall be composed of five men to serve one, two, three, four, and five years, respectively, in addition to the Editor.

"6. The Constitution and By-laws shall be revised, setting aside $2.50 of the annual dues of each member as an annual subscription to the *Journal of Dental Research*, instead of $3.50 as now provided for. [Although the amount "of the annual dues of each member as an annual subscription to the *Journal of Dental Research*" was specified as $3.50 in the Constitution, the *Journal of Dental Research* has never accepted more than $2.50 per member per volume, in accordance with its non-commercial policy to give to the members of affiliated societies each copy at the *lowest reduction that may be made from its regular subscription price of $5.00* without losing its privilege of distribution in the mails at the second-class rate of postage.—*Ed.*]

"7. In order to assist in disposing of unpublished papers, and papers which may be accumulated before the *Bulletin* can be placed on a satisfactory basis of production, it is suggested that the First District Dental Society avail itself of the offer of the *Journal of the American Dental Association* to publish such papers of the First District Dental Society as are submitted to that Journal."

Various amendments of the Constitution of the Society that were required for the consummation of this plan have been adopted. The first issue of the enlarged *Bulletin* was published in September, 1929. It is planned to issue it monthly throughout the year.

II. New York Academy of Dentistry

Notes from the minutes of the proceedings in 1928–29

Malcolm W. Carr, D.D.S., Editor

OFFICERS

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SCIENTIFIC MEETINGS

During the season of 1928–29, the New York Academy of Dentistry held six regular meetings. They were convened at the Commodore Hotel, New York City, and were preceded by informal dinners.

October. L. V. Kimbrell, D.D.S., Detroit, Mich., presented a paper on "A method of compensating for the variables in making dental castings."[1] The presentation was accompanied by lantern slides illustrating a new casting process and technic developed by Dr. Kimbrell. Discussion was opened by Major W. S. Rice, D.C., Army Medical School, Washington, D. C.

November. A series of progressive clinics was held, as follows: "Partial denture designs, giving special thought to the maintenance of functional occlusion," by Dr. Clyde H. Schuyler. "Gold inlays, indirect technic," by Dr. Frederic W. Pratt. "Ceramics," by Dr. Oscar J. Chase, Jr. "Orthodontia technology: (a) lingual arch; (b) labial arch with 92 i round; anterior section fitting into angle; bracket bands; (c) record casts," by members of the Orthodontia Staff, Columbia University, New York City.

January. James Roy Blayney, B.S., M.S., D.D.S., Chicago, Ill., presented a paper on "Tissue reaction in the apical region to known types of treatment."[2] Dr. Edwin G. Van Valey opened the discussion.

February. A symposium on "Preventive dentistry"[3] was presented

[1] The author has not submitted a manuscript for publication.

[2] Blayney: *Journal of Dental Research*, 1929, ix, p. 221.

[3] Tracy, Leonard, Delabarre, and Davis: *Journal of Dental Research*, 1929, ix, p. 611.

in four parts as follows: "Operative measures in the prevention of dental caries," by Dr. W. D. Tracy. "The prevention of peridontal lesions," by Dr. H. J. Leonard. "The prevention of orthodontic abnormalities," by Dr. Frank A. Delabarre, Boston, Mass. "Diet as a factor in preventive dentistry," by Dr. Sherman L. Davis, Indianapolis, Indiana.

March. The fourth annual series of progressive table clinics was presented as follows: "Swaged platinum base; the application to individual crown restoration," by Dr. George Straussberg. "Porcelain jacket and inlay preparation," by Dr. William J. Meier. "Some oral surgical points of interest to the general practitioner," by Dr. Douglas B. Parker. "Movable fixed bridgework," by Dr. Henry Wasserman.

April (annual meeting). Reports of officers and committees were presented. The following officers were elected for the coming year: *President*, S. E. Davenport, Jr.; *Vice-president*, Leuman M. Waugh; *Secretary*, Lowrie J. Porter; *Treasurer*, Alfred L. Kohn; *Editor*, Malcolm W. Carr.

Two Associate Fellows, Dr. William C. Keller and Dr. William J. Meier, were elevated to active fellowship in the Academy in recognition of achievement and distinction in professional activities.

The custom of presenting at the annual meeting a program of entertainment, rather than of scientific discussion, was again followed. Mr. John Mulholland, an authority on the theory and practice of magic, supplied the entertainment.

REPORT OF THE DENTAL CENTER COMMITTEE

The following report of the Dental Center Committee, presented at the meeting in April 1928, and promptly distributed in printed form to all of the members, was accepted by the Academy. The statement of principles therein set forth, and the supplementary section of the report, were unanimously adopted at the meeting in April 1929.

"Your Committee, appointed in April 1927, to consider the possibility and advisability of creating a dental center, and a permanent home for the New York Academy of Dentistry, has given the problem serious consideration, and has deliberated for months in searching for a wise course to pursue.

We have reached certain preliminary conclusions, which are now offered to the Academy.

"(a) We believe that there is no question about the desirability of creating a dental center in New York City. Practically all other dignified professions have erected permanent homes in New York and dentistry should not be an exception.

"(b) In our consideration of the question, and particularly in estimating the source and amount of funds likely to be available for such an enterprise, this committee has been confronted by the pertinent question: 'What will be the future status of the dental profession?' In the minds of some influential individuals there is a question whether dentistry will continue as a separately organized profession.

"Your committee believes that it would be useless to continue further in its work until the New York Academy of Dentistry definitely and decisively puts itself on record in this matter. In order to place the question before the Academy for its consideration, the following statement of principles is offered:

"1. The practice of dentistry is a natural division of *health-service*. It should be developed in close coördination with the practice of medicine and all other related means of health promotion. In service to the patient, it should be made the full *equivalent* of an oral specialty of medical practice. Both objectives can be achieved by intimate coöperation among practitioners, and by instruction in dental schools conducted in close affiliation with medical schools, hospitals, and dispensaries.

"2. In addition to dentistry's hygienic and medical duties, the mechanical and esthetic requirements of dental practice give it very special responsibilities, the exactions of which promise to increase steadily as research and experience extend its scope. The methods and procedures in these essential phases of dental practice cannot be suitably included in the training for general *medical* practice or any other means of health service. *They can be taught and developed most effectively, in the interest of the patient, by a profession avowedly devoted to their appropriate use and continual betterment.* But these weighty considerations are minimized or disregarded by some who urge that general dental practice (a) should be made legally *a part* of the general practice of conventional medicine, or (b) should be *based* by statute upon the training required for the M.D. degree.

"3. The New York Academy of Dentistry, attentive to these important conditions yet without any diminution of its abiding purpose to promote intimate association and coöperation between dentists and the practitioners

of all other kinds of health-service, believes that, in the interest of the patient, dentistry should be *continued* as a separately organized profession, based on systems of ethics, education, jurisprudence, and journalism that will fully meet all public needs at each stage of its evolution.

"*Supplementary section of the report.* Your committee has further agreed that in the event of the adoption of the foregoing statement of principles it would be justified in offering the following recommendation:

"As probably the most effective course to pursue toward the realization of a dental center in the broadest conception of the term would be to make the start on a conservative basis, and as this committee was authorized only to report on the *advisability* of proceeding, we recommend that a dental center committee be authorized to proceed to draft plans that may seem practicable at the present time, such as the creation of a library, meeting quarters and conference rooms for the Academy. It is further recommended that the committee be authorized to survey the sources of funds available for such a development."

RESOLUTION ON PROFESSIONAL JOURNALISM: APPROVED BY THE BOARD OF GOVERNORS OF THE ACADEMY AND DISTRIBUTED IN PRINTED FORM TO ALL OF THE MEMBERS

"*Whereas*, in the Article on Ethics in the By-laws of the Academy it is stated that 'Fellows of the Academy shall conduct their practices and their activities in the profession in such a manner as will uphold and further the objects for which the Academy was organized;' and,

"*Whereas*, Section 2 of the same Article provides that 'any violation of this code of ethics may result in forfeiture of fellowship;' and,

"*Whereas*, Section 1 of Article I of the By-laws of this Academy specifically states that one of the objects of this Academy shall be 'to encourage and develop professionally controlled journals for the publication of dental literture;' and,

"*Whereas*, any effort on the part of a Fellow of this Academy to bring about the adoption of a dental supply-house periodical as the official organ of publication of any dental society is detrimental to the cause of professional journalism and is inimical to the best interests of the dental profession; Therefore be it

"*Resolved*, that this responsibility of Fellows in relation to upholding the cause of professional journalism be brought to the attention of the Academy by publication of this resolution in the notice of the next monthly meeting." [January]

III. International Association for Dental Research memoranda on the proceedings in 1928–29[4]

William J. Gies, F.A.C.D., Secretary

SEVENTH GENERAL MEETING

The seventh general meeting of the International Association for Dental Research was held in Chicago, Ill., on March 23 and 24, 1929, at the Dental School of Northwestern University. On the evening of March 23 the members, after a dinner at the Medical and Dental Arts Building, at 185 North Wabash Ave., held there the annual business meeting, which included an address by the president, and the election of new members and officers. The chairmen at the sessions were Drs. Leroy M. S. Miner, Harvard University, President, and Arthur D. Black, Northwestern University, President-elect. Forty-seven members and an equal number of visitors attended the morning and afternoon sessions each day, and thirty-six papers on research were subjected to animated and instructive discussion. Most of the papers, besides treating of general biological aspects of dentition, such as the growth of the molar teeth after eruption, by H. H. Donaldson, of Philadelphia, and the dental arches of identical twins, by Samuel Goldberg, of Chicago, described research in "medical" sciences applied to dentistry, only two having been devoted chiefly to mechanical phases of dental practice. Close correlations with medical practice were considered in papers on bone regeneration, dental infection as a factor in chronic colitis and autointoxication, influence of oral infections on conditions of the blood, paroxysmal hemoglobinuria caused by organisms in dental infection, anaphylactic response to sensitization from shallow cavities in teeth, polyarthritis and carditis second-

[4] A brief outline of the organization and early development of the International Association for Dental Research, including the Constitution, was published on pages 197–208 of Volume VIII (1928) of the *Journal of Dental Research*. It was followed by a summary of the proceedings of the general meetings from 1920 to 1927, inclusive, and a register of membership as of March 15, 1928 (pages 209–233). Records of the proceedings of the sixth general meeting were published in Volume VIII of the *Journal of Dental Research*—abstracts of the papers, page 395; memoranda of executive proceedings, page 696.

ary to oral infection, etc. Abstracts of the thirty-six scientific communications, and lists of the newly elected officers and members, were published on pages 269–303 of this volume. There are now 174 members.

This meeting was remarkable in the history of the Association from the fact that two whole days were devoted to the presentation and discussion of the results of research, and an evening to executive affairs. The value of separate organization of the Association for the promotion of research is clearly shown by the fact that no other society in any profession would be willing to devote so much time *exclusively* to research in the science and art of dentistry.

SECTIONS

The sections in existence at the date of the last general meeting were those in Ann Arbor, Boston, Chicago, Halifax, Minnesota, New York, Philadelphia, Pittsburgh, San Francisco, St. Louis, and Toronto. Since that meeting a section has been organized in Vienna.

During 1928–29 meetings of the sections were held on this schedule: *Ann Arbor*, May 16. *Boston*, March 11. *Chicago*, October 16, January 14, May 23. *Halifax*, August 8, August 17, November 2, March 15. *Minnesota*, January 17, February 27. *New York*, none. *Philadelphia* (in affiliation with the Academy of Stomatology), January 22, April 19. *Pittsburgh*, October 16, November 5, December 3, January 7, February 4, March 4, April 1, May 6, June 3. *San Francisco*, none. *St. Louis*, September 12, October 10, November 14, December 15, January 12, February 14, March 14, April 11, May 9, June 13. *Toronto*, March 11, May 13.

Proceedings of sectional meetings have been published on pages 75, 79, and 609 of this volume.

NEXT GENERAL MEETING

The eighth general meeting will be held in Toronto, Canada, in March 1930, in coördination with the next annual meeting of the American Association of Dental Schools. The scientific sessions of the Association and of its sections are open to visitors.

REGISTER OF MEMBERS AND OFFICERS: DECEMBER 1, 1929

Members

1. *Ann Arbor Section.*—R. W. Bunting, Faith P. Hadley, Philip Jay, C. J. Lyons, **U. G. Rickert*, E. O. Scott, M. L. Ward—7

2. *Boston Section.*—L. W. Baker,* *F. R. Blumenthal*, W. G. Bridge, F. P. Chillingworth, H. DeW. Cross, Adelbert Fernald, C. E. Hatch, E. A. Hooton, P. R. Howe, A. L. Johnson, V. H. Kazanjian, P. A. Leavitt, L. M. S. Miner, A. L. Morse, F. W. Morse, William Rice, A. P. Rogers, Benjamin Spector, K. H. Thoma, Benjamin Tishler, Harry Trimble, G. H. Wright—22

3. *Chicago Section.*—Lloyd Arnold, William Bebb, H. C. Benedict, Olaf Bergeim, A. D. Black, J. R. Blayney, E. P. Boulger, E. D. Coolidge, D. J. Davis, R. H. Fouser, T. L. Gilmer, E. H. Hatton, Rudolf Kronfeld, H. A. McGuigan, F. B. Moorehead, Emil Mueller, Anna C. Nichols, F. B. Noyes, V. T. Nylander, W. F. Peterson, H. A. Potts, B. O. Sippy, W. G. Skillen, N. G. Thomas, **S. D. Tylman*, W. H. Welker—26

4. *Halifax Section.*—J. S. Bagnall, R. J. Bean, W. G. Dawson, A. W. Faulkner, W. C. Oxner, S. G. Ritchie, R. P. Smith, **G. K. Thomson*, E. G. Young—9

5. *Minnesota Section.*—E. S. Best, J. T. Cohen, I. A. Epstein, B. S. Gardner, C. J. Grove, H. A. Maves, J. F. McClendon, F. S. Meyer, G. S. Monson, W. D. Vehe, C. W. Waldron, **D. E. Ziskin*—12

6. *New York Section.*—Adolph Berger, Theodor Blum, C. F. Bödecker, L. R. Cahn, M. W. Carr, H. E. S. Chayes, G. W. Clapp, H. S. Dunning, W. B. Dunning, J. D. Eby, W. J. Gies, H. W. Gillett, W. K. Gregory, Milo Hellman, I. Hirschfeld, R. G. Hutchinson, Jr., T. P. Hyatt, J. M. Inouye, Maxwell Karshan, F. C. Kemple, Frances Krasnow, H. J. Leonard, J. O. McCall, F. S. McKay, A. H. Merritt, E. G. Miller, Jr., H. F. Osborn, Alfred Owre, **B. B. Palmer*, J. P. Ruyl, M. I. Schamberg, P. R. Stillman, L. M. Waugh, B. W. Weinberger, J. L. Williams, J. L. Young—36

7. *Philadelphia Section.*—J. L. T. Appleton, Jr., **Mrs. C. K. Bryant*, J. A. Detlefsen, W. G. Downs, Jr., R. H. Ivy, Joseph McFarland, J. V. Mershon, W. R. Pentz, S. E. Pond, Hermann Prinz, A. Hopewell-Smith, C. R. Turner—12

8. *Pittsburgh Section.*—T. W. Brand, Kaethe W. Dewey, F. C. Friesell, H. E. Friesell, W. F. Swanson, **L. E. Van Kirk*, W. H. Wright—7

9. *St. Louis Section.*—B. E. Lischer, E. B. Owen, **C. O. Simpson*, G. B. Winter—4

* Secretary of the Section.

10. *San Francisco Section.*—G. L. Bean, J. A. Marshall, E. H. Mauk, G. S. Millberry, F. H. Orton, **J. S. Shell*, F. V. Simonton—7

11. *Toronto Section.*—J. F. Adams, G. R. Anderson, H. K. Box, **A. J. Broughton*, Thomas Cowling, W. E. Cummer, A. W. Ellis, C. Jane Fraser, Andrew Hunter, F. C. Husband, A. J. McDonagh, E. W. Paul, H. S. Thomson, W. C. Trotter, A. E. Webster—15

12. *Vienna Section.*—Bernhard Gottlieb, Ernst Kellner, **Emerich Kotanyi*, Moriz Leist, B. Orban, A. M. Schwarz, Georg Stein, Josef Weinmann, Herman Wolf—9

13. Not yet members of a section: *Baltimore.*—E. V. McCollum. *Cleveland.*—S. W. Chase, F. C. Waite. *Indianapolis.*—S. L. Davis. *Iowa City.*—A. W. Bryan, R. H. Volland. *Louisville.*—T. B. Beust. *Washington, D. C.*—F. E. Rodriguez—8

Total number of members—174

Officers: 1929–30

President—Arthur D. Black, Northwestern University
President-elect—U. G. Rickert, University of Michigan
Vice-president—A. E. Webster, University of Toronto
Treasurer—William Rice, Tufts College
Secretary—William J. Gies, Columbia University

IV. Quotations from Comment Relating to the Status of Dentistry

A. Carnegie Foundation for the Advancement of Teaching, October 1928. Twenty-third Annual Report, pp. 65–67.

"It is very regrettable . . . . that many universities which have obtained large sums of money for the support of medical education are unable to arouse public interest in their dental schools, and that, in some universities, dentistry is not envisaged as an essential division of practical health service that requires active development in accord with the importance of its functions.

"This state of affairs is not due entirely to unconcern. It arises in part from an opinion in influential minds that dentistry should be included in general medical practice, or converted into a formal specialty of conventional medicine and founded on a full training for general medical practice, and that further development of dental schools would interfere with this transformation. But this plan, wherever it

* Secretary of the Section.

is intended primarily to promote the public welfare, appears to depend upon an erroneous conception of the nature and conditions of general dental practice as it is now expanding to meet its direct obligations. It also disregards legal, economic, and educational obstacles in the way of such a retrogressive change. Its adoption would involve a much longer period of formal training for dentistry than for any present specialty of medical practice. Furthermore, even if no allowance be made for the need for an increasing number of physicians and dentists, it would necessitate either admission to the existing overcrowded medical schools of about 150 per cent of the present attendance, or the creation of approximately 40 additional medical schools. It is commonly agreed that as a rule the best general practice of dentistry is conducted by those who, trained in dental schools in close coördination with medical schools, make their work equivalent in service value to an oral specialty of statutory medical practice, and who include expert use of the many mechanical and esthetic procedures that require dentistry to be developed as a separate division of medicine in its most comprehensive sense. In dental instruction that is incidental to medical training these essentials would not receive the attention their import for the patient demands. Even those who would include dentistry in *general* medical practice do not appear to realize that dentistry cannot be improved by dividing the field between, on one hand, advisory and consultive service and the incidental extraction of deficient teeth or casual surgical operations in the mouth by physicians, trained chiefly to attend to matters they would regard as more important, and, on the other hand, fitting oral and dental appliances and artificial substitutes, filling and cleaning teeth, and similar mechanical operations, by technicians. Nothing in successful modern dental practice as health service justifies public encouragement of these superficial expectations.

"Measures for prevention, and for the application of medical principles, are fundamental in dental practice, and are being made steadily more effective. But the mechanical and esthetic requirements are also essential, and are becoming increasingly exacting as the corresponding intra-oral procedures multiply and attain greater complexity. The separate organization and promotion of dentistry not only has been vindicated by past achievements and present quality, but also is

a guarantee that further development of the mechanical and esthetic aspects of dental practice will not be neglected. Those who would reverse the normal growth by which the branches of science and of medicine become wider, and longer, and then subdivide, might advantageously consider these two questions:

"(1) Should dentists, noting in their patients the correlations between dental conditions and, say, arthritis, be expected, with all their other duties of practice, to include in their service the *treatment* of arthritis; or should they be taught to note these correlations and, by *advisory* health service, to guide patients to proper treatment of the arthritis by physicians?

"(2) Should physicians, noting in their patients the correlations between, say, arthritis and dental conditions, be expected, with all their other duties of practice, to include in their service the *treatment* of dental conditions; or should they be taught to note these correlations and, by *advisory* health service, to guide patients to proper treatment of the dental conditions by dentists?

"It is obvious that no person can possibly practise dependably the whole expanding range of health service; that physicians and dentists should do well the proper work of their respective domains; and that both types of practitioners, because of the interdependence of their professions, should coöperate intimately in attention to over-lapping responsibilities for the benefit of the patient. It is equally true that the service of such growing professions as the practice of medicine and the practice of dentistry, each of which taxes the ability of the most learned and proficient, could be acceptably combined in only the few general practitioners who are so exceptional as to prove the negative rule. Yet it is earnestly proposed by some that this condition should be ignored in the education of physicians and dentists by obliging the latter to receive the training of the former.

"In practice and consultation in the larger communities, in health boards, in hospitals, in the schools of dentistry and of medicine, and in research, there will be increasing opportunity for a relatively small number of physician-dentists who, well educated and experienced in both medicine and dentistry, would provide intellectual and professional leadership in health service on the border between the two fields of practice. But the few who may achieve this position could be

most effectually trained in combined medical and dental curricula intended to afford this exceptional type of education. This procedure was suggested in Bulletin Number Nineteen as one of the means of effecting a desirable reconstruction of dental education. It seems probable that, if such combined curricula, after preliminary experience in their conduct, were well integrated rather than made convenient adjustments of routine courses established for other purposes, the total number of professional years would not exceed six."

B. Association of American Universities, November 1928. Report of the Committee on Dental Education; *Journal and Proceedings of the Thirtieth Annual Conference*, p. 37.

"Your Committee believes that the only hope for dentistry lies in its restoration to its former status of a specialty of medicine, with the ultimate incorporation of existing schools of dentistry into the better medical schools. The moment for this is actually arriving; for instance, the Commission on Medical Education is calling urgent attention to the changes and readjustments necessary in the undergraduate [medical] curriculum."[5]

C. American College of Dentists, March 1929. Resolutions in a report by the Committee on Education, Research, and Relations; *Circular to members.* (Adopted by a vote of 18 to 1 in a total of 250.[6])

"*Whereas* the American College of Dentists is cognizant of the opinion and sentiment, expressed in certain sections of this country, that dental practice could more effectually fulfill its functions by becoming an integral part of medical practice; and

"*Whereas* it is being represented that this opinion is held or endorsed by a considerable portion of the dental profession; therefore, it is hereby

"*Resolved* that the American College of Dentists records its conviction that the above mentioned opinion does not represent the views of more than an extremely small minority of the members of the dental profession; also

[5] The report containing this opinion, although not "accepted" or "adopted" by the Association, was "made a part of the records" (p. 34). "The Committee on Dental Education, having served its purpose," was discontinued (p. 38).

[6] Resolutions to the same effect were adopted by the Dental Society of the State of New York, in May 1929. See page 754 for a record of similar action by the New York Academy of Dentistry.

"*Resolved* that dentistry, which has evolved during the past ninety years as a natural and distinct division of health service, can best meet the needs of mankind by the further development of its ideals and service through separate and special educational activities, professional practice, and statutory regulation; also

"*Resolved* that the existing personal and professional coöperation and mutual helpfulness between dentists and physicians, and between dentists and practitioners of other kinds of health service, should be continued and strengthened, and that, in harmony with the objects and history of the American College of Dentists, suitable means should be taken by the College at all times to further this accord; also

"*Resolved* that the present officers and committees of the American College of Dentists, and those hereafter to be selected, are authorized to state publicly the facts and convictions in these resolutions, whenever and wherever it may be appropriate and desirable to present them."

V. Important Books Recently Received by the Journal of Dental Research[7]

Pathology for students and practitioners. Authorized translation of the *Lehrbuch der Pathologischen Anatomie* by Dr. Edward Kaufmann, Professor of General Pathology and Pathological Anatomy, and Director of the Pathological Department, University of Göttingen. *Translated* by Stanley P. Reimann, M.D., Pathologist and Director of the Research Institute of the Lankenau Hospital, Philadelphia; Assistant Professor of Experimental Pathology in the Graduate School of the University of Pennsylvania. *Three volumes;* 1072 illustrations; $30. P. Blakiston's Son and Co., Philadelphia.

This text is, or should be, an invaluable one to persons dealing with any phase of abnormality (pathology) of the human body. In three-volume form it covers practically the entire field of human pathology, with the wealth of material and accuracy of observation of the original author, which has made "Kaufmann" one of the necessities for any pathologist's or medical man's shelves. There is added to this translation an even greater wealth of material and of keen analysis as supplied by the translator, gathered from his years of valuable study

[7] The sizes of the pages, exclusive of margins, are given in inches.

as pathologist to the Lankenau Hospital in Philadelphia, where he has had an opportunity to observe innumerable cases of both surgical and autopsy material. There is a section devoted to pathological conditions of the teeth, mouth, and associated parts, as judged from the point of view of the medically trained man and the pathologist, which should be of inestimable value to the dental practitioner. In addition to this, the pathologies of the various organs and groups, as well as general pathological changes, should be a most important guide to the dentist's understanding of pathological processes from the point of view of the man in general medicine. *William G. Downs, Jr.*, B.A., *M.A., D.D.S., School of Medicine, Yale University.*

Physical properties of dental materials. (Gold alloys and accessory materials.) By R. L. COLEMAN, Research Associate, U. S. Bureau of Standards. 1928: pp. 72; $7\frac{3}{4}$ x $4\frac{3}{8}$ in.; 66 illustrations; $0.35. United States Government Printing Office, Washington, D. C.

The normal and pathological physiology of bone. By R. LERICHE, Professor de Clinique Chirurgicale a la Faculté de Strasbourg, and A. POLICARD, Professor d'Histologie a la Faculté de Lyon. *Translation* by SHERWOOD MOORE, M.D., Professor of Radiology, and J. ALBERT KEY, M.D., Assistant Professor of Clinical Orthopedic Surgery, Washington University School of Medicine, St. Louis. 1928: pp. 236; 7 x 4 $\frac{1}{8}$ in.; 33 illustrations; $5.00. C. V. Mosby Co., St. Louis.

Dental jurisprudence. An epitome of the law of dentistry and dental surgery. By ELMER D. BROTHERS, B.S., LL.B., Professor of Medical and Dental Jurisprudence in the University of Illinois, and Lecturer in John Marshall Law School, Chicago. *Second edition.* 1928: pp. 246; 6 x $3\frac{1}{2}$ in.; no illustrations; $2.25. C. V. Mosby Co., St. Louis.

Tuberculosis and public health. The Hermann M. Biggs Memorial Lecture for 1927, at the New York Academy of Medicine. By ALLEN K. KRAUSE, A.M., M.D., Director, Kenneth Dows Tuberculosis Research Laboratories, Johns Hopkins University, Baltimore. 1928; pp. 54; $7\frac{1}{4}$ x $4\frac{1}{2}$ in.; no illustrations.

The North American cup-fungi (Operculates). By FRED JAY SEAVER, M.S., Ph.D., Curator in the New York Botanical Garden, and Editor of Mycologia. 1928: pp. 284; 7 x 4 in.; 61 illustrations; $5.00. Published by the author.

A textbook of oral pathology for students and practitioners of dentistry. By RUSSELL W. BUNTING, D.D.S., D.D.Sc., Professor of Dental Histology and Pathology, University of Michigan, Ann Arbor, Michigan. 1929: pp. 495; 7⅜ x 4¼ in.; 327 illustrations; $7.00. Lea and Febiger, Philadelphia.

Hygiene of the mouth and teeth. By THADDEUS P. HYATT, D.D.S., F.A.C.D., Professor of Preventive Dentistry, New York University Dental School, and Assistant Medical Director, Metropolitan Life Insurance Company. 1929: pp. 64; 4½ x 2¾ in.; 1 illustration. Brooklyn Dental Publishing Company, Brooklyn, N. Y.

Dental anatomy. Classroom and laboratory quiz compend, with supplementary notes. By WILLIAM C. STILLSON, D.D.S., Associate Professor of Dental Anatomy, Dental School, Western Reserve University, Cleveland, Ohio. 1929: pp. 280; 6⅛ x 3¾ in.; 5 illustrations; $2.25. W. B. Saunders Co., Philadelphia and New York.

The rise and fall of oral hygiene in Bridgeport. By GEORGE WOOD CLAPP, D.D.S., Editor of *Dental Digest.* 1929: pp. 104; 8 x 4½ in.; 11 illustrations. Dental Digest, New York City.

The business side of dentistry. By EDWIN N. KENT, D.M.D., Lecturer on conduct of practice, Harvard University Dental School. 1929: pp. 180; 6¾ x 4 in.; 13 illustrations; $5.00. C. V. Mosby Co., St. Louis.

Treatise on a neglected phase of dentistry. By HENRY F. LIBBY, D.M.D., and ARTHUR A. LIBBY, D.M.D., Instructors in dental research, Harvard Dental School; Clinicians in exo-orthodontia, Forsyth Dental Infirmary, Boston, Mass. 1927: pp. 90; 7⅞ x 5 in.; 85 illustrations. Privately printed by the authors, Boston.

Dental histology and embryology. By B. ORBAN, M.D., Professor of Dental Histology and Pathology, Chicago College of Dental Surgery, Dental Department of Loyola University. *Second edition.* 1929: pp. 218; 7 x 4⅛ in.; 201 illustrations; $4.00. P. Blakiston's Son and Co., Inc., Philadelphia.

Four lectures on "local analgesia in dental practice." Delivered, under the auspices of the Dental Board of the United Kingdom, by C. H. HOWKINS, F. N. DOUBLEDAY, F. ST. J. STEADMAN, and A. T. PITTS. 1929: pp. 119; 7¾ x 4⅝ in.; 104 illustrations. Dental Board of the United Kingdom, 44 Hallam Street, Portland Place, London, W. I.

Supplement to the third report of the Commission on Medical Education. WILLARD C. RAPPLEYE, M.D., Director of the Study. 1929: pp. 82; 7 x 4 in.; no illustrations. Published by the Commission, 215 Whitney Avenue, New Haven, Conn.

Practical conclusions from scientific research in denture conduction. By ALFRED GYSI, D.D.S., M.D. (hon.), D.M.D. (hon.), Professor of Prosthetic Dentistry and Director of the Histological Laboratory, University of Zurich, Switzerland. 1929: pp. 40; $7\frac{3}{4}$ x $4\frac{3}{4}$ in.; 37 illustrations. Dentists' Supply Company of New York.

Fundamentals of pathology. By JOSEPH SCHROFF, B.S., M.D., D.D.S., Associate Professor of Oral Pathology, School of Dental and Oral Surgery, Columbia University. 1929: pp. 109; $7\frac{1}{4}$ x $4\frac{3}{4}$ in.; 40 illustrations; $2.50. William Albert Broder, New York City.

Outline of bacteriology. By HENRY A. BARTELS, B.S., D.D.S., Lecturer on Bacteriology, School of Oral Hygiene, Columbia University. 1929: pp. 128; $6\frac{5}{8}$ x 4 in.; 47 illustrations; $2.00. William Albert Broder, New York City.

Annual report (reprints) of the investigations carried out under the supervision of the Therapeutic Research Committee of the Council on Pharmacy and Chemistry of the American Medical Association. Volume XVII. 1928: 16 reprints; $7\frac{1}{4}$ x $4\frac{1}{2}$ in.; 43 illustrations. American Medical Association, Chicago.

Contribución al estudio de los factores físico-químicos de la osteo y odontogenesis. By GUILLERMO V. STUCKERT, Professor of Biological Chemistry, University of Cordova, Argentine Republic. 1929: pp. 162; $7\frac{1}{8}$ x $4\frac{1}{4}$ in.; 105 illustrations. University of Cordova, Cordova, Argentine Republic.

Dental bibliography. A reference index to the literature of dental science and art as found in the Libraries of the New York Academy of Medicine and Bernhard Wolf Weinberger. Compiled by BERNHARD WOLF WEINBERGER, D.D.S., Librarian of the First District Dental Society; Advisory Librarian, Dental Library, New York Academy of Medicine. *Second edition.* 1929: pp. 183; $7\frac{1}{2}$ x $4\frac{1}{2}$ in.; no illustrations. Published under the auspices of the First District Dental Society of the State of New York, New York City.

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American illustrated medical dictionary. A complete dictionary of the terms used in medicine, surgery, dentistry, pharmacy, chemistry, nursing, veterinary science, biology, medical biography, etc. By W. A. Newman Dorland, A.M., M.D., F.A.C.S., member of the Committee on Nomenclature and Classification of Diseases, American Medical Association, and Editor of the "American Pocket Medical Dictionary"; with the collaboration of E. C. L. Miller, M.D., Professor of Bacteriology and Biochemistry, Medical College of Virginia. *Fifteenth edition.* 1929: pp. 1427; 8¼ x 4½ in.; 525 illustrations; flexible binding—plain, $7.00; thumb index, $7.50. W. B. Saunders Company, Philadelphia and London.

Dental bibliography. A reference index to the literature of dental science and art as found in the Libraries of the New York Academy of Medicine and Bernhard Wolf Weinberger. Compiled by Bernhard Wolf Weinberger, D.D.S., Librarian of the First District Dental Society; Advisory Librarian, Dental Library, New York Academy of Medicine. *Second edition.* 1929: pp. 183; 7½ x 4½ in.; no illustrations. Published under the auspices of the First District Dental Society of the State of New York, New York City.

Deutsche Zahnheilkunde. Heft 75. 1929: 8 x 4½ in.; marks 3.60. Georg Thieme, Leipsig, Germany. (1) Submaxillare Röntgenaufnahmen, ein neues Verfahren zur röntgenographischen Darstellung des Unterkiefers und seiner Zahne. By Dr. J. v. Reckow, Marburg. Pp. 15; 30 illustrations. (2) Klinik und Diagnostik der Osteodystrophia fibrosa localisata der Kiefer. By Dr. Karl Spring, Vienna. Pp. 15; 7 illustrations.

Fundamentals of pathology. By Joseph Schroff, B.S., M.D., D.D.S., Associate Professor of Oral Pathology, School of Dental and Oral Surgery, Columbia University. 1929: pp. 109; 7½ x 4½ in.; 40 illustrations; $2.50. William Albert Broder, New York City.

Outline of bacteriology. By Henry A. Bartels, B.S., D.D.S., Lecturer on Bacteriology, School of Oral Hygiene, Columbia University. 1929: pp. 128; 6½ x 4 in.; 47 illustrations; $2.00. William Albert Broder, New York City.

Annual report (reprints) of the investigations carried out under the supervision of The Therapeutic Research Committee of the Council on Pharmacy and Chemistry of the American Medical Association. *Volume XVII.* 1928: 16 reprints; 7¼ x 4½ in.; 43 illustrations. American Medical Association, Chicago, Illinois.

Dental histology and embryology. By B. Orban, M.D., Professor of Dental Histology and Pathology, Chicago College of Dental Surgery, Dental Department of Loyola University. *Second edition.* 1929: pp. 218; 7 x 4½ in.; 201 illustrations; $4.00. P. Blakiston's Son and Co., Inc., Philadelphia.

Four lectures on "local analgesia in dental practice." Delivered, under the auspices of the Dental Board of the United Kingdom, by C. H. Howkins, F. N. Doubleday, F. St. J. Steadman, and A. T. Pitts. 1929: pp. 119; 7½ x 4½ in.; 104 illustrations. Dental Board of the United Kingdom, 44 Hallam Street, Portland Place, London, W. I.

Practical conclusions from scientific research in denture construction. By Alfred Gysi, D.D.S., M.D. (hon.), D.M.D. (hon.), Professor of Prosthetic Dentistry and Director of the Histological Laboratory, University of Zurich, Switzerland. 1929: pp. 40; 7½ x 4½ in.; 37 illustrations. Dentists' Supply Company of New York.

The rise and fall of oral hygiene in Bridgeport. By George Wood Clapp, D.D.S., Editor of *Dental Digest.* 1929: pp. 104; 8 x 4½ in.; 11 illustrations. Dental Digest, New York City.

The business side of dentistry. By Edwin N. Kent, D.M.D., Lecturer on conduct of practice, Harvard University Dental School. 1929: pp. 180; 6½ x 4 in.; 13 illustrations; $5.00. C. V. Mosby Co., St. Louis, Mo.

Treatise on a neglected phase of dentistry. By Henry F. Libby, D.M.D. and Arthur A. Libby, D.M.D., Instructors in dental research, Harvard Dental School; Clinicians in exo-orthodontia, Forsyth Dental Infirmary, Boston, Mass. 1927: pp. 90; 7½ x 5 in.; 85 illustrations. Privately printed by the authors, Boston, Mass.

A text-book of oral pathology for students and practitioners of dentistry. By Russell W. Bunting, D.D.S., D.D.Sc., Professor of Dental Histology and Pathology, University of Michigan, Ann Arbor, Michigan. 1929: pp. 495; 7½ x 4½ in.; 327 illustrations; $7.00. Lea and Febiger, Philadelphia, Pa.

Hygiene of the mouth and teeth. By Thaddeus P. Hyatt, D.D.S., F.A.C.D., Professor of Preventive Dentistry, New York University Dental School, and Assistant Medical Director, Metropolitan Life Insurance Company. 1929: pp. 64; 4½ x 2¾ in.; 1 illustration. Brooklyn Dental Publishing Company, Brooklyn, N. Y.

Dental anatomy. Classroom and laboratory quiz compend, with supplementary notes. By William C. Stillson, D.D.S., Associate Professor of Dental Anatomy, Dental School, Western Reserve University, Cleveland, Ohio. 1929: pp. 280; 6½ x 3¾ in.; 5 illustrations; $2.25. W. B. Saunders Co., Philadelphia and New York.

Physical properties of dental materials. (Gold alloys and accessory materials.) By R. L. Coleman, Research Associate, U. S. Bureau of Standards. 1928: pp. 72; 7½ x 4½ in.; 66 illustrations; $0.35. United States Government Printing Office, Washington, D. C.

The normal and pathological physiology of bone. By R. Leriche, Professor de Clinique Chirurgicale a la Faculté de Strasbourg, and A. Policard, Professor d'Histologie a la Faculté de Lyon. Translation by Sherwood Moore, M.D., Professor of Radiology, and J. Albert Key, M.D., Assistant Professor of Clinical Orthopedic Surgery, Washington University School of Medicine, St. Louis. 1928: pp. 236; 7 x 4½ in.; 33 illustrations; $5.00. C. V. Mosby Co., St. Louis.

Dental jurisprudence. An epitome of the law of dentistry and dental surgery. By Elmer D. Brothers, B.S., LL.B., Professor of Medical and Dental Jurisprudence in the University of Illinois, and Lecturer in John Marshall Law School, Chicago. *Second edition.* 1928: pp. 246; 6 x 3½ in.; no illustrations; $2.25. C. V. Mosby Co., St. Louis.

The practice of periodontia. By Sidney Sorrin, D.D.S., Chief of Periodontia Clinic, and Samuel C. Miller, D.D.S., Instructor, Periodontia Clinic, College of Dentistry, New York University. 1928: pp. 160; 6 x 3¾ in.; 122 illustrations; $3.50. MacMillan Company, New York.

Dental state board questions and answers. By R. Max Goepp, M.D., Professor of Principles and Practice of Medicine and of Clinical Medicine, Woman's Medical College of Pennsylvania, Philadelphia. *Fourth edition.* 1928: pp. 463; 7¼ x 4½ in.; no illustrations; $4.50. W. B. Saunders Co., Philadelphia and London.

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